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**M I N I - C O U R S E**

# Lattices and modular forms


Prof René Schoof (University of Rome ‘Tor Vergata’, Italy)


25, 26, 27 & 28 November 2025 | 10h00-12h00 SAST

**Venues:**
NITheCS Seminar Room, Merensky Building, Merriman Avenue, Stellenbosch University and Online

*--- A recording of the talk will be published on the NITheCS YouTube channel after the event ---*

## ABSTRACT


In this short course we cover the basic properties of Euclidean lattices, sphere packings and relations with modular forms.


## BIOGRAPHY

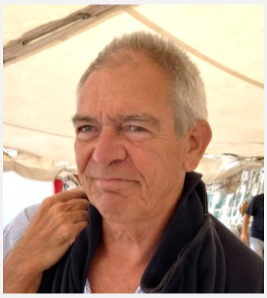
René Schoof, professor at the University of Rome ‘Tor Vergata’ in Italy, is a mathematician from the Netherlands who works in number theory, arithmetic geometry, and coding theory. He received his PhD in 1985 from the University of Amsterdam with Hendrik Lenstra (Elliptic Curves and Class Groups).

In 1985, Prof Schoof discovered an algorithm which enabled him to count points on elliptic curves over finite fields in polynomial time. This was important for the use of elliptic curves in cryptography, and represented a theoretical breakthrough, as it was the first deterministic polynomial time algorithm for counting points on elliptic curves. The algorithms known before (e.g. the baby-step giant-step algorithm) were of exponential running time. His algorithm was improved by A. O. L. Atkin (1992) and Noam Elkies (1990).

He obtained the best-known result extending Deligne's Theorem for finite flat group schemes to the non-commutative setting, over certain local Artinian rings. His interests range throughout Algebraic Number Theory, Arakelov theory, Iwasawa theory, problems related to the existence and classification of Abelian varieties over the rationals with bad reduction in one prime only, and algorithms.

Prof Schoof has also worked with Rubik's Cubes, creating a common strategy in speedsolving known as F2L Pairs, which has been used to set many world records. Using this method, the solver creates four 2-piece "pairs" with one edge and corner piece which are each "inserted" into F2L slots in the CFOP method to finish the first two layers of a 3x3x3 Rubik's cube. This strategy is also applied to cubes of higher order (4x4x4 and up) in the Reduction, Yau, and Hoya methods if CFOP is used for their 3x3x3 stages.

He also wrote a book on Catalan's conjecture.



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